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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,828	08/05/2004	Daniel C. Edelstein	FIS920040159	4827

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EXAMINER
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PIZARRO CRESPO, MARCOS D

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/710,828

Applicant(s)

EDELSTEIN ET AL.

Examiner

Marcos D. Pizarro-Crespo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 10-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☒ Claim(s) 8 and 9 is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>8/5/2004</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

Attorney's Docket Number: FIS920040159US1 (00750492AA)

Filing Date: 8/5/2004

Claimed Foreign Priority Date: none

Applicant(s): Edelstein et al.

Examiner: Marcos D. Pizarro-Crespo

### **DETAILED ACTION**

This Office action responds to the election filed on 12/12/2005.

#### ***Election/Restrictions***

1. Applicant's election with traverse of species 2, reading on figure 6, is acknowledged. Claim 10 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Claim 1 is generic to all the species.
2. Applicant's traversal is on the ground that there would not be an undue burden in examining the species in a single application. This is not found persuasive.
3. In the restriction requirement mailed on 11/28/2005, the examiner set forth that the species include mutually exclusive characteristics that make them patentably distinct from each other. The applicants have failed to submit or identify any evidence showing the species to be obvious variants or clearly admit on the record that this is the case. Thereby, searching for each of the species would require separately searching for each of their mutually exclusive characteristics.
4. Because the applicants have failed to advance reasons leading to the conclusion that the species claimed are considered clearly unpatentable over each other and

because the species would require searching a separate subject of inventive effort, the requirement is still deemed proper and is therefore made FINAL.

### ***Drawings***

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters **120** and **130** have both been used to designate the same wiring (see, *e.g.*, figs. 1-3).

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character **120** has been used to designate both a conductor (see, *e.g.*, par.0033/II.3) and a trench (see, *e.g.*, par.0021/II.9).

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **415** (see, *e.g.*, fig. 5) and **450** (see, *e.g.*, fig. 6).

8. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters **410** (see, *e.g.*, fig. 4) and **420** (see, *e.g.*, figs. 5 and 6) have both been used to designate the same alloying liner.

9. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37

CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1-4, 6, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Besser (US 6633085).

12. Regarding claim 1, Besser (see, e.g., fig. 7) shows all aspects of the instant invention including an integrated circuit including:

- A first layer **30** having metal or metal alloy at a surface thereof
- A second layer **34** adjacent to said surface and having a metal or metal alloy via **52** therein
- An interlayer connection between the metal or metal alloy of the first layer **30** and the via **52**

wherein the interlayer connection comprises an alloy region **50** restricted by a barrier layer **46** to an interfacial region between the metal or metal alloy of the first layer **30** and the via **52**.

13. Regarding claim 2, Besser shows the metal or metal alloy of the first layer is a first metal **30** and the metal or metal alloy of the second layer is a second metal **52** (see, e.g., fig. 7).

14. Regarding claim 3, Besser shows the metal or metal alloy comprises copper (see, e.g., col.4/ll.51).

15. Regarding claim 4, Besser shows the barrier includes a layer of tantalum nitride (see, e.g., col.5/ll.54).

16. Regarding claim 6, Besser shows the metal alloy of the interlayer connection at said interface includes tin (see, e.g., col.5/ll.17).

17. Regarding claim 7, Besser shows the barrier **46** is above the interlayer connection and the metal alloy of the interlayer connection **50** is confined to a region below the barrier **46** (see, e.g., fig. 7).

### ***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Besser in view of Aller (US 6884329).

21. Regarding claim 5, Besser shows most aspects of the instant invention (see, e.g., paragraph 12 above). Besser also shows that the barrier may be tantalum or tantalum nitride (see, e.g., col.5/ll.54). He, however, fails to show the barrier including both a layer of tantalum and a layer of tantalum nitride. Aller (see, e.g., col.5/ll.46-50), however, teaches that using both, tantalum would act as an adhesion layer and tantalum nitride as a barrier layer.

It would have been obvious at the time of the invention to one of ordinary skill in the art to have Besser's barrier comprising a layer of tantalum and a layer of tantalum nitride, as suggested by Aller, to have a copper diffusion barrier layer functioning as both an adhesion and a barrier layer.

#### ***Allowable Subject Matter***

22. Claims 8 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

23. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

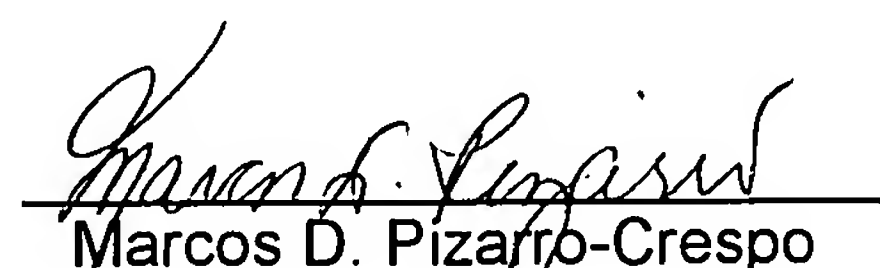
24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(571) 272-1716** and between the hours of 9:30 AM to 8:00 PM (Eastern Standard Time) Monday through Thursday or by e-mail via [Marcos.Pizarro@uspto.gov](mailto:Marcos.Pizarro@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (571) 272-1705.

25. Any inquiry of a general nature or relating to the status of this application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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26. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/750-766	1/27/2006
Other Documentation:	
Electronic Database(s): EAST (USPAT, EPO, JPO)	1/27/2006

  
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